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Patent Department  
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EXAMINER

MCKENZIE, THOMAS C

ART UNIT

PAPER NUMBER

1624

DATE MAILED: 01/24/2002

11

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/514,023

Applicant(s)

GURTLE ET AL.

Examiner

Thomas McKenzie Ph.D.

Art Unit

1624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. This action is in response to an application filed on 12/18/01. There are twenty-one claims pending and twenty-one under consideration. Claims 22-42 are synthesis claims. This is the second action on the merits. The application concerns some ring closing diene metathesis reactions conducted in ionic liquids. Examiner Reid has left the USPTO and the application transferred to Examiner McKenzie.

#### ***Response to Amendment***

2. Applicants' amendment to the specification overcomes the objection made in point #2 of the previous office action. Applicants' definition of starting material in claim 22, overcomes the indefiniteness rejection made in point #3-b-i. Applicants' use of the singular heteroatom overcomes the indefiniteness rejection made in point #3-b-iii. Applicants' deletion of molecule from claim 28 overcomes the indefiniteness rejection made in point #3-b-iv. "Reaction medium" is an art-recognized term meaning the combination of reactants, solvent, catalysts, and products of a reaction. It has antecedent basis and the indefiniteness rejection made in point #3-b-v is withdrawn. Applicants' deletion of "may", "are comprise", and addition of "group" overcomes the indefiniteness rejection made in point #3-c. Applicants' specifying that substituent  $\text{NRR}^1$  is in the a-position to one of the

reacting double bonds overcomes the indefiniteness rejection made in point #3-d. Variables R and R<sup>1</sup> have separate definitions and are not indefinite for that reason. Applicants' deletion of the preferably language overcomes the indefiniteness rejection made in point #3-e. Applicants' argument regarding the cyclic compounds formed from R<sup>3</sup> to R<sup>7</sup> and the definition of variables R<sup>3</sup> to R<sup>5</sup> is persuasive. Thus, the indefiniteness rejections made in points #3-f-iii and #3-g are withdrawn.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 22-28, 41, and 42 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "cyclic compounds" in claim 22 is indefinite. What atoms and what types of bonds are used to form these cyclic compounds?

4. The phrase "substituted ... alkene or alkyne units" in claim 22 is indefinite. Substituted by what?

5. The phrase “transition metal” in claim 22 is indefinite. Does this include lanthanides and/or actinides? How about the trans uranium metals? Is the element actinium, with no known stable isotopes included?

6. The phrases “compounds that form transition metal carbenes under the reaction conditions” and “alkylating agents” in claim 22 and “substituent that is inert in the metathesis reaction” in claim 24 are unduly functional. Applicants are attempting to define the structures of specific chemical compounds used in Applicants’ claimed process. Names, structures, and chemical formulas precisely define organic molecules. Attempting to define structure by function is not proper when the structures can be clearly expressed in terms that are more precise. It is not sufficient to define a chemical structure solely by a chemical property.

7. The phrase “heterocyclic compounds” in claim 23 is indefinite. What is the nature of this ring? All the word “heterocyclic” implies that at least one ring is involved and at least one member of this ring is not a carbon atom. What atoms are permitted? Are they oxygen, nitrogen, and sulfur or is a metal or a halogen permitted? What is the size of this ring? Is there any limit? What is the nature of the bonding? How many rings can there be, only one or are fused and bridged rings also allowed? Must the ring be unsaturated or are saturated and aromatic rings also allowed?

8. The word “heteroatom” in claim 24 is indefinite for two reasons. Firstly, other than the fact the atom is not carbon, are there any limits? Can it be silicon, phosphorus, or boron? Secondly, do Applicants intend this heteroatom to be a substituent on the reacting starting material like a chlorine atom or an oxo group? May the heteroatom be in the chain of the starting material and be a member of the newly formed ring like an oxy or amino group?

9. The phrase “the heteroatom is selected from the group ...” in claims 25 and 26 is indefinite. With the exception of “halogen” and “metal centers”, none of the listed choices is a single atom, as required by the word “heteroatom”. Furthermore, “metal centers” is combined with “oxygen-containing heterocycles”. Is this choice required to have both features? Is a “metal center” a single metallic atom or something else, like a metal binding site? Alternatively, is the “heteroatom” required to be a halogen only?

10. The listed groups, in claims 25, and 26, “rings”, “acids”, “esters”, “ethers”, “ammonium salts”, “amides”, “nitriles”, “alkynes, alkenes”, “halogen”, “alcohols, ketones, aldehydes, carbamates, carbonates, urethanes, sulphonates, sulphones, sulfonamides”, “organosilane units”, and heterocycles” are indefinite. Firstly, all of these are molecules, not radicals with a free valence attachable to the starting material. Secondly, are there any limitations as to what may be attached to the

functional groups included in this list? For example, does “aldehyde” include only alkyl aldehyde? On the other hand, are benzaldehyde and furfural also intended? How is the “aldehyde” attached to the starting material, is it through the central atom of the functional group or might it be through a side chain? Is the radical HC(O)- included? What ever choices Applicants make must be supported in the specification. Thirdly, what is a “unit”? Fourthly, all the word "heterocycle" implies that at least one ring is involved and at least one member of this ring is not a carbon atom. What atoms are permitted? Are they oxygen, nitrogen, sulfur, and phosphorus or is a metal or a halogen permitted? What is the size of this ring? Is there any limit? What is the nature of the bonding? How many rings can there be, only one or are fused and bridged rings also allowed? Must the ring be unsaturated and aromatic or are saturated rings also allowed?

11. The phrase “organic substituent” in claim 27 is indefinite. All organic implies is the present of at least one carbon atom at an oxidation state lower than +4. Are there any limitations upon the structure of the substituent?

Applicants’ traversed the indefiniteness rejection made in point #3a of the previous office action arguing that broad claims are not necessarily unclear. The Examiner agrees with this but does point out that broad claims can raise issues of enablement that are not of immediate relevance here. In this action the Examiner

has asked some specific questions regarding transition metals, alkylating agents, organosilicon units, etc raised previously, if not specifically, in the previous office action. If Applicants cannot answer the questions, then how is the public to understand the scope of the claims?

12. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The variables  $R^3$  and  $R^4$  are shown in formulas (III), (IV), and (VI) as single bonded to carbon atoms and thus maybe the monovalent radicals hydrogen, alkyl etc. However, in formula (V), the variables  $R^3$  and  $R^4$  are shown as double bonded to molybdenum. The definition of  $R^3$  and  $R^4$  does not allow for these double bonds in formula (V).

Applicants argue that one of skill in the art would select only those radicals capable of forming a double bond. None of the radicals listed can form a double bond.

13. Structure (VI) is shown as a +1 or +2 charged ion. The laws of chemistry require isolated compounds to be electrically neutral. The specification does not make clear what, if any, negatively charged counter ions are intended. *Ex parte Diamond* 123 USPQ 167, *Ex parte Pedlow* 90 USPQ 395.



14. Claim 37 recites the limitation " $R^3$  to  $R^5$  are ... cycloalkyl" in lines 1-2. There is no antecedent basis for this limitation in the parent claim. The variables  $R^3$  to  $R^5$  are restricted to alkyl groups in the parent claim 34.

Applicants argue that the limitation providing for ring formation among these three variables provides the antecedent basis. This is not persuasive for three reasons. Firstly, this would permit any pair of these three variables to form a ring but the claim language would allow any single one of them to be a cycloalkyl group. That is clearly not contemplated in the parent claim. Secondly, the ring formed by linking any two variables would include a metal atom. As such, it would not be a cycloalkyl ring.

15. Claim 35 recites the limitation "catalyst precursors" in line 1. There is no antecedent basis for this limitation in the claims 34 and 22, upon which claim 35 depends. Claims 34 and 22 list "catalyst component" and "catalyst". A precursor, presumably is a compound not itself a catalyst but which yields a catalytically active species under the conditions of the reaction. The Examiner is aware that the structure of the active catalyst species in many metathesis reactions is not well characterized. However, whatever transition metal complex, added at the start of the process and necessary to the completion of the process, can be called the

catalyst no matter what its final form. Thus, we do not know what Applicants intend by the additional limitation precursor.

16. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 22-42 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention. The how to use requirement for a process claim requires that the process produce compounds of some economic importance. A disclosure that fails to teach any utility for the compounds prepared means that one skilled in the chemical process arts would not know how to use Applicants' invention. Similarly, use of the disclosed compounds as intermediates for the production of other compounds for which no utility is known does not meet the how to use requirements of 35 USC 112, first paragraph. The U.S. Court of Customs and Patent Appeals held *In re Moore; In re Pitt and Bender*, 170 USPQ 260 that "[t]he narrow holding in *Manson* was that a chemical process is not "useful" in the sense of 35 U.S.C. 101 unless the product of that process has a specific practical utility. That holding may be extrapolated to the further ruling that a chemical compound is

not "useful" in the sense of the patent law merely because it is a chemical compound. Indeed, later cases of this court have held that even where the compound is readily recognizable as an intermediate for chemical synthesis, it is not "useful" unless the product of that synthesis possesses the requisite utility. See *In re Kirk*, 54 CCPA 1119, 376 F.2d 936, 153 USPQ 48 (1967); *In re Joly*, 54 CCPA 1159, 376 F.2d 906, 153 USPQ 45.

Turning to the specification as a guide for the usefulness of the products of Applicants' process, there is a generalized but non-specific statement in lines 24-28, page 3 which does not give any intended use for Applicants' "cyclic compounds". Examples 5 and 6 produce cyclohexene, which is an article of commerce. Thus, its use is apparent to one skilled in the art. Examples 1, 2-4, and 7 produce a dihydropyrrole, a 3-carbamoylcyclohexene, and a thirteen-membered lactam respectively, whose usefulness is not apparent and for which none is asserted the specification.

17. Claims 22-32 and 34-42 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention. The how to make requirement of process claims concerns operability of the claimed process. The U.S. Court of Customs

and Patent Appeals held *In re Marzocchi and Horton*, 169 USPQ 367 that “a specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as in compliance with the enabling requirement of the first paragraph of § 112 *unless* there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. Assuming that sufficient reason for such doubt does exist, a rejection for failure to teach how to make and/or use will be proper on that basis; such a rejection can be overcome by suitable proofs indicating that the teaching contained in the specification is truly enabling.” Also, “additional factors, such as the teachings in pertinent references, will be available to substantiate any doubts that the asserted scope of objective enablement is in fact commensurate with the scope of protection sought and to support any demands based thereon for proof.[Emphasis in original and footnote deleted]. This principle was affirmed in a chemical process case *In re Armbruster*, 185, USPQ 152.

There are three grounds for doubting operability. Firstly, the ring closing metathesis reaction appears to be capricious with regard to substrate structure and subjected to unexpected and unexplained failures. Armstrong (J. Chem. Soc.

Perkin I) has two tables on pages 384 and 386 with one column labeled “success” and the other “failure” for a series of identical functional groups, ring sizes, and catalysts with plenty of entries for both columns. How can one judge which of Applicants’ claimed processes will succeed and which will fail if this is the state of the art? U.S. District Court District of Connecticut held in *MOBIL OIL CORPORATION v. W.R. GRACE & COMPANY*, 180 USPQ 418 that “there is an inherent mystery surrounding the unpredictability of the performance of catalysts; a mystery which is generally recognized and acknowledged by chemists in the cracking art. This is one more reason why the presumption of patent validity “should not be disregarded especially in a case of this sort where the intricate questions of chemistry involved are peculiarly within the particular competence of the experts of the Patent Office.” *Merck & Co. v. Olin Mathieson Chemical Corp.*, 253 F.2d 156, 164, 116 USPQ 484, 490 (4th Cir. 1958). “The catalytic action can not be forecast by its chemical composition, for such action is not understood and is not known except by actual test.” *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 368-369 (1928). Also see, *Application of Grant*, 304 F.2d 676, 679, 134 USPQ 248, 250-251 (CCPA 1962); *Rich Products Corp. v. Mitchell Foods, Inc.*, 357 F.2d 176, 181, 148 USPQ 522, 525-526 (2d Cir. 1966), cert. denied 385 U.S. 821, 151 USPQ 757 (1966); *Ling-Temco-Vought, Inc. v.*

*Kollsman Instrument Corp.*, 372 F.2d 263, 268, 152 USPQ 446, 450-451 (2d Cir. 1967); *Georgia-Pacific Corp. v. United States Plywood Corp.*, 258 F.2d 124, 132-133, 118 USPQ 122, 128-129

18. Secondly, Applicants' claims 22-28, 41, and 42 are drawn to dienes, and enynes with unlimited substitution on the double bonds. Armstrong (J. Chem. Soc. Perkin I) says in section 3.2.1, page 373 referring to the ring closing metathesis reaction that "substrate double bonds are generally monosubstituted". Further stating that "di- or tri-substituted double bonds are metathesised by this catalyst", implying that such substituted double bond substrates are the exception and not the rule. In 3.3.1 on page 376, concerning a different catalyst, she says "[i]n all cases the alkene generated by the ring closure was disubstituted" meaning that only bis monosubstituted olefin substrates undergo ring closure. Do Applicants believe that any tetra-substituted olefin is capable of participating in the claimed process? Do Applicants believe that most tri and disubstituted olefins will cyclize with all the claimed "transition metal carbenes"?

19. Thirdly, claims 29-40 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the dienes used having the formula (I) with R = hydrogen and R<sup>1</sup> = carboxymethyl, does not reasonably provide enablement for other choices of R and R<sup>1</sup>. The specification does not

enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. As explained above the ring closing metathesis reaction appears to be capricious. Campagne (Tet. Lett.) in the scheme at the bottom of page 6177 makes the point that small changes in the protecting groups and oxidation state of substituents changes a process that is operative into one that is inoperative. Replacing the t-BOC group (-C(O)-OC(CH<sub>3</sub>)<sub>3</sub>) with trityl (-C(C<sub>6</sub>H<sub>5</sub>)<sub>3</sub>) changes an inoperative process into an operative one, compounds 4 and 15. Replacing the t-BOC group (-C(O)-OC(CH<sub>3</sub>)<sub>3</sub>) with benzyl (-CH<sub>2</sub>C<sub>6</sub>H<sub>5</sub>) changes an operative process into an inoperative one, compounds 7a and 7c, Table I, page 6176. Replacing the benzyl (-CH<sub>2</sub>C<sub>6</sub>H<sub>5</sub>) with trityl (-C(C<sub>6</sub>H<sub>5</sub>)<sub>3</sub>) changes it back into an operative one, compounds 7c and 7e. These examples involve changes in substituents, remote from the reaction site, and in atoms not undergoing any changes in bonding.

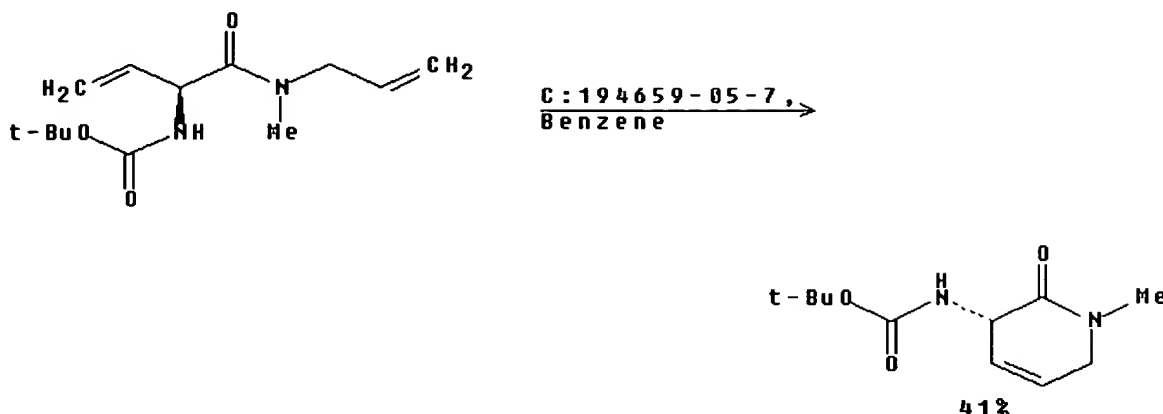
***Claim Rejections - 35 USC § 103***

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22-28, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campagne (Tet. Lett.). The reference teaches the reaction shown below. The catalyst used in the reference is the ruthenium carbene complex 3b, shown on page 6176. The Applicant claims a process of preparing a cyclic compound from a  $\alpha, \omega$ -diene containing a heteroatom. Applicant has the additional limitations of a  $\alpha$ -substituent  $\text{NRR}^1$ , where R is hydrogen and  $\text{R}^1$  is COOR. The reference teaches such a process with the nitrogen containing diene pictured below that contains a  $\alpha$ -substituent  $\text{NRR}^1$ , where R is hydrogen and  $\text{R}^1$  is COO-tert-butyl. Applicant claims the process conducted in the presence of an ionic liquid. The reference teaches the process conducted in benzene. The reaction is shown in the reference in Scheme 2, page 6176 with compound 7a. The difference between the claimed and taught process is the solvent used. Applicant claims an ionic liquid solvent. The reference teaches the hydrocarbon solvent benzene. Change in solvent is routine experimentation for the organic chemist optimizing the yields of his reaction in the absence of unexpected results.





21. In the alternative, claims 22-28, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campagne (Tet. Lett.) as applied above, further in view of Oliver (Chem. Ind.). The ring closing diene metathesis reaction is a special type of olefin metathesis. Oliver (Chem. Ind.) teaches using ionic liquids for olefin metathesis in the last paragraph on page 253. The motivation for changing solvents is supplied by the secondary reference, "[w]e have obtained very good results" and "[the catalyst] can be reused several times".

In the previous office action, all claims were rejected as obvious using the review article Armstrong as the primary reference. In this action, the Examiner has chosen only to reject Applicants' broader claims to all cyclic compounds and to those of any tetrahydroaniline compound containing an additional heteroatom in the ring. The Applicants have argued that no prima facie case was made, that not all elements of Applicants' claim limitations are taught by the two references, and that no motivation exists to combine references. In point #20, determining

optimum reaction conditions such as solvent specifically is not a patentable invention *Ex parte Goldschmidt* 123 USPQ 41. In point #21 the Examiner has considered all claim limitations and has relied upon the motivational statement supplied internally in the secondary reference.

***Allowable Subject Matter***

22. Applicants' claims are patentable over Buijsman (Organic Lett.) because this reference, which teaches using ionic liquids for the ring closing diene metathesis reaction, is not a competent reference because of Applicants' effective filing date of 3/5/99.

***Conclusion***

23. Please direct any inquiry concerning this communication or earlier communications from the Examiner to Thomas C McKenzie, Ph. D. whose telephone number is (703) 308-9806. The FAX number for before final amendments is (703) 872-9306. The Examiner is available from 8:30 to 5:30, Monday through Friday. If attempts to reach the Examiner by telephone are unsuccessful, you can reach the Examiner's supervisor, Mukund Shah at (703) 308-4716. Please direct general inquiries or any inquiry relating to the status of this application to the receptionist whose telephone number is (703) 308-1235.

TCMcK  
January 21, 2002



*for* Mukund Shah  
Supervisory Patent Examiner  
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